

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
 From: Paul Harden <pharden@aoc.nrao.edu>
 Subject: [1498] DATA SHEET: Common TRANSISTORS
 Message-ID: <199507052145.PAA23458@zia.aoc.nrao.edu>

DATA SHEETS de NA5N: BIPOLAR TRANSISTORS (Common to QRP rigs)
 (Definitions at bottom)

DEVICE	----->	2N2222	2N2222A	2N3904	2N3906	2N4401	2N4403
TYPE/USAGE		NPN GPA	NPN GPA	NPN LNA	PNP LNA	NPN GPA	PNP GPA
CASE		T0-92	T0-39	T0-92	T0-92	T0-92	T0-92
MAXIMUM RATINGS							
Vce	V	30	40	40	40	40	40
Veb	V	5	6	6	5	6	5
Ic	mA	800	800	200	200	600	600
Pd	W	0.4	0.8	0.6	0.6	0.6	0.6
SMALL SIGNAL CHARACTERISTICS							
Vbe(sat) V		0.6-1.3	0.6-1.2	0.7-0.9	0.7-0.9	0.7-1.0	0.7-1.0
hfe (gain)		50-300	50-300	100-400	100-400	40-500	60-500
Ft	MHz	250	300	300	250	250	200
Noise Fig.		4dB	4dB	5dB	4dB	--	--
hie (Zin)		2K-8K	2K-8K	1K-10K	2K-12K	1K-15K	1K-15K
Cin	pF	30	25	4	10	30	30
Cout	pF	8	8	8	5	6	9
Tr	nS	25	25	50	50	20	20
Tf	nS	60	60	90	90	30	30

DEVICE	----->	MPS918	MPS2222 (2N2222)	MPS5179 (2N5179)	2N5109
TYPE/USAGE		NPN HFA	NPN GPA	NPN HFA	NPN HFA
CASE		T0-92	T0-92	T0-92	T0-39
MAXIMUM RATINGS					
Vce	V	15	40	12	20
Veb	V	3	6	2.5	3
Ic	mA	50	800	50	400
Pd	W	0.4	0.8	0.2	2.5
SMALL SIGNAL CHARACTERISTICS					
Vbe(sat) V		1.0 max	0.6-1.2	0.7-1.0	0.7-1.1
hfe (gain)		20-250	50-300	25-300	40-120
Ft	MHz	900	300	2000	1200

Noise Fig.	6dB	4dB	5dB	3 dB
hie (Zin)	na	2K-8K	na	50K
Cin	pF 2	25	2	7
Cout	pF 3	8	3	3
Gve (V. Gain)				11dB
Gpe (Pwr Gain)	15dB		15dB	
Tr/Ton	nS na	25	na	na
Tf/Toff	nS na	60	na	na

CASE: T0-92=encapsulated plastic EBC T0-39=metal can EBC
 USAGE: GPA=gen. purpose amp. LNA=low noise amp HFA=high freq. amp.
 Vce= Max. collector-emitter volt. Veb= Max. emitter-base volt.
 Ic= Max. collector current Pd= Max. power dissipation
 Vbe(sat)=base-emitter saturation voltage, min-max range
 hfe= gain (frequency dependent) Ft= max. freq. (where gain=1)
 hie= approx. input impedance Cin/Cout= in/out capacitance
 Tr/Ton= turn-on time Tf/Toff= turn-off time [for digital switching times]

*** T0-92 B* T0-39
*** Plastic *E C* metal can
(looking at // (bottom view)
EBC flat side) Tab

REF: Motorola Small Signal Transistors Device Data Book, 1991 ed.

GL de Paul, NA5N (pharden@nrao.edu)

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
 From: Paul Harden <pharden@aoc.nrao.edu>
 Subject: [1495] DATA SHEET: LM386
 Message-ID: <199507052140.PAA23265@zia.aoc.nrao.edu>

[QRP Tech Note Series de NA5N]
 DATA SHEET: LM386 LOW VOLTAGE AUDIO POWER AMPLIFIER

Manufactured by National Semiconductor
 Price range, single units: \$1.00-1.50

**** PIN-OUT ****

GAIN --(1)-	-(8)-- GAIN
-INPUT --(2)-	-(7)-- BYPASS
+INPUT --(3)-	-(6)-- Vs (+V)

****FEATURES**

- * Battery operation
- * Minimum external parts
- * Wide supply voltage range:
4V-12V or 5V-18V

GND --(4)-| |-(5)-- V OUT

* Low Current Drain: 4mA
* Voltage gains from 20-200

LM386N 8-pin plastic DIP for 0 to 75C operation

**DESCRIPTION

The LM386 is a power amplifier designed for use in low voltage consumer applications. The gain is internally set to 20 to keep external parts count low, but the addition of an external resistor and capacitor between pins 1 and 8 will increase the gain to any value up to 200. The inputs are ground references while the output is automatically biased to one half the supply voltage.

**ABSOLUTE MAXIMUM RATINGS		LM386-1,-3	LM386-4
Vcc	Max. operating voltage	+15v	+22v
Vin	Input voltage	+/- 0.4v	+/- 0.4v
Pd	Power dissipation	660mW	1.25W
Ta	Operating temperature range	0C to +70C	0C to +70C

**AC/DC ELECTRICAL CHARACTERISTICS at Ta=25C, Vcc=6v

		LM386-1,-3	LM386-4
Vs	Operating supply voltage	4-12v	5-18v
Iq	Quiescent Current at Vs=6v	4-8 mA	4-8 mA
Pout	Output power	LM386-1 250- 325 mW typ; Vs=6v RL=8 ohms LM386-3 500- 700 mW typ; Vs=9v RL=8 ohms LM386-4 700-1000 mW typ; Vs=16v RL=16 ohms	
Av	Voltage gain, Vs=6v f=1 KHz	26 dB typ, pins 1-8 open 46 dB typ, 10uF from pin 1 to 8	
BW	Bandwidth Vs=6v	300 KHz (pins 1 and 8 open)	
THD	Total Harmonic Distortion	0.2%	
Rin	Input resistance	50K	
Ib	Input Bias Current	250 nA, Vs=6v, pins 2 and 3 open	

GAIN CONTROL

To make the LM386 more versatile, two pins (1 and 8) are provided for gain control. With pins 1 and 8 open, the 1.35K internal resistor sets the gain at 20 (26 dB). If a capacitor is put from pin 1 to 8, bypassing the 1.35K resistor, the gain will go up to 200 (46 dB). When using the LM386 with higher gains (external cap on pins 1 and 8), it is necessary to bypass the unused input, preventing degradation of gain and instability. This is done with a 0.1uF capacitor or a short to ground depending on the dc source resistance on the driven input.

**DESIGN NOTES (From personal experience)

1. Almost an undestructable device; wire it up and it works.
2. For proper operation with stability, I recommend:

Ground pin 2 (+IN) and capacitively couple to pin 3 (-IN); bypass pin 7 with 0.1uF cap to ground; to drive Lo-Z speaker/phones, connect 33-100uF cap, +side to pin 5, -side to 1K or less pot to ground; run speaker/phones directly off of driver.

3. Avoid using "volume control" on input; messes up biasing and can cause oscillation.
4. Without proper bypassing/coupling, device can oscillation >100 KHz; not audible, audio mushy or "ringy," but if you're using the LM386 for audio derived AGC, the AGC voltage will be meaningless.

72/73 de NA5N (pharden@nrao.edu)

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: Paul Harden <pharden@aoc.nrao.edu>
Subject: [1496] DATA SHEET: MC1350
Message-ID: <199507052143.PAA23424@zia.aoc.nrao.edu>

[QRP Tech Note Series de NA5N]
DATA SHEET: MC1350P MONOLITHIC I.F. AMPLIFIER

Manufactured by Motorola (Info from Motorola Linear/Interface Data Book)

** PIN-OUT **		**FEATURES	
-OUTPUT --(1)-	-(8)-- +OUTPUT	* Power Gain: 50dB at 45MHz	
Vcc --(2)-	-(7)-- GND	* AGC Range: 60dB min	
GND --(3)-	-(6)-- +INPUT	* Constant input & output	
-INPUT --(4)-	-(5)-- AGC INPUT	admittance over AGC range	
		* Single volt. power supply	

MC1350P 8-pin plastic DIP for 0 to 75C operation

**DESCRIPTION

The MC1350P monolithic IF amplifier is an integrated circuit featuring wide range AGC for use as an IF amplifier in radio and TV over the temperature range 0 to +75 deg. C. The MC1352 is similiar in design but has a keyed-AGC amplifier as an integral part of the same chip.

**ABSOLUTE MAXIMUM RATINGS

Vcc	Max. operating voltage	+18 vdc
-----	------------------------	---------

V _{agc}	AGC Supply voltage	Not to exceed V _{cc}
V _{in}	Differential input voltage	5.0 vdc
P _d	Power dissipation	625mW (derate 5mW/deg.C >25C)
T _a	Operating temperature range	
	MC1350P	0C to +75C (degrees)

****AC/DC ELECTRICAL CHARACTERISTICS** at T_a=25C, V_{cc}=6v

	AGC range (5.0 to 7.0v)	60dB (min), 68dB (typ)
A _p	Power gain, 45MHz BW=4.5MHz	50dB
	10.7MHz BW=350KHz	58dB
V _o	Differential output swing	20Vpp (with no AGC)
		8Vpp (with-30dB AGC)
I _{1,7}	Output current (pins 1+8)	5.6mA (typical)
I _s	Total supply current	14mAdc(typ), 17mAdc (max)
P _d	Power dissipation	168mW (typ), 204mW (max)

[Following parameters for 10.7MHz]

g ₁₁	Single ended input admittance	0.36mmhos
g ₂₂	Output admittance	4.4umhos
y ₁₂	Reverse transfer admittance	<<1 umho
y ₂₁	Forward transfer admittance	160mmhos
C _{in}	Single ended input cap.	7.2pF (typ)
C _o	Differential output cap.	1.2pf (typ)

****AGC ACTION**

(From curve, input AGV voltage vs. gain reduction in dB)

V _{agc} input=	5.0v	5.5v	6.0v	6.5v	7.0v
Gain reduction=	0dB	8dB	16dB	45dB	68dB

[On the AGC response, its kinda sluggish from 5 to 6 volts, then linear from 6.0v to 6.7v, then flattens out >6.7v]

****DESIGN NOTES** (From data sheet and personal experience)

1. Collector voltage for the output amplifier must be supplied through a center-tapped tuning coil to pins 1 and 8. [Pin 1 and 8 to the coil or transformer ends, the center tap to +V_{cc} or pin 2.]
 2. [The MFJ 90xx QRP rig drawings are INCORRECT on the output of U2 MC1350. Transformer T2 primary goes to pins 1 and 8, (not 1 and 2) while +10v V_{cc} goes to pin 2 (not pin 8 as shown) and to the transformer T2 center tap].
 3. [AGC voltage less than 5.0v produces no gain reduction].
 5. [In early 1995, single unit costs from mail order vendors for a MC1350P was about \$2.00 each (Dalbani Corp.)].
-

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: Paul Harden <pharden@aoc.nrao.edu>
Subject: [1497] DATA SHEET: NE602
Message-ID: <199507052142.PAA23403@zia.aoc.nrao.edu>

[QRP Tech Note Series de NA5N]
DATA SHEET: NE602/SA602 DOUBLE BALANCED MIXER AND OSCILLATOR

Manufactured by Signetics (Info from Signetics Data Book, pg. 4-69+)

[The NE602 was designed initially for the cellular telephone industry.
Some information from the data sheets not applicable to QRP or general
HF work is omitted. -NA5N]

*** PIN-OUT ***

INPUT A --(1)-| |-(8)-- Vcc
INPUT B --(2)-| |-(7)-- OSC. OUT
GND --(3)-| |-(6)-- OSC. IN
OUTPUT A --(4)-| |-(5)-- OUTPUT B

***FEATURES

- * Low current, 2.4mA typical
- * Excellent noise figure <5dB
- * Excellent gain, intercept
and sensitivity
- * Low external parts count

NE602N: 8-pin plastic DIP for 0 to 70C
SA602N: 8-pin plastic DIP for -40 to 85C
NE602F: 8-pin ceramic DIP for 0 to 70C

***APPLICATIONS

- * Mixer/Oscillator
- * Portable radio/transceivers
- * HF/VHF frequency conversion

***DESCRIPTION

The SA/NE602 is a low-power VHF monolithic double-balanced mixer with input amplifier, on-board oscillator, and voltage regulator. It is intended for high performance, low power communication systems. The mixer is a "Gilbert Cell" multiplier configuration which typically provides +18dB gain at 45MHz. The oscillator will operate to 200MHz. It can be configured as a crystal oscillator, a tuned tank oscillator or a buffer for an external L.O. The noise figure at 45MHz is typically less than 5dB. The gain, intercept performance, low-power and noise characteristics make the SA/NE602 a superior design choice for high-performance battery operated equipment.

***ABSOLUTE MAXIMUM RATINGS

Vcc	Max. operating voltage	9 vdc
Tstg	Storage temperature	-65C to +150C

Ta	Operating temperature range	
	NE602	0C to +70C (degrees)
	SA602	-40C to +85C

```

-----
**AC/DC ELECTRICAL CHARACTERISTICS at Ta=25C, Vcc=6v
Vcc Power supply voltage range 4.5v (min) to 8.0v (max)
    DC current drain 2.4mA(typ) to 2.8mA(max)
Fin Input signal frequency 500MHz (typical)
Fosc Oscillator frequency 200MHz (typical)
    Noise figure at 45MHz 5.0dB(typ) to 6.0db(max)
    Conversion gain at 45MHz 14dB (min) 18dB(typ)
Rin RF input resistance 1.5K (min)
Cin RF input capacitance 3pF (typ) to 3.5pF (max)
Ro Mixer Output resistance 1.5K (typ) (pins 4 or 5)
-----

```

The SA602 is capable of receiving -119dBm signals with a 12dB S/N ratio at 45MHz in cellular telephone applications.

[Lab tests shows the NE602 is ~-122dBm @7mHz; -118dBm @10.1MHz -NA5N]

**DESIGN NOTES (From data sheet and personal experience)

1. RF inputs (pins 1,2) are biased internally; they are symmetrical and can be used interchangeably, but do not bias externally. [AC coupled only or from LC tuned circuit or transformer].
2. Mixer outputs (pins 4,5) also internally biased, connected to Vcc through internal 1.5K resistors. [They can thus be used as single ended output without upsetting the balance of the mixer].
3. Oscillator capable of sustaining oscillation beyond 200MHz in crystal or tuned tank circuits. [External L.O. injection should be at least 200mV, such as for the TX mixer or BFO for a product det.]
4. [When stealing oscillator power from pin 7 to another circuit, an FET or transistor buffer should be used for minimum loading and isolation].
5. [In early 1995, single unit costs from mail order vendors for a NE602N was about \$3.00 each].

72/73 de NA5N (pharden@nrao.edu)

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
 From: mitchell@dtcs70.dtc.Kodak.COM (Brad Mitchel)
 Subject: [1471] FS: Ten Tec Triton II
 Message-ID: <9507051158.AA14026@dtcs70.dtc.kodak.com>

Hi, I'm posting this for a friend.

For Sale Ten Tec Triton II. Full Solid State
80-10 meter transceiver. CW & ssb . Variable output
from a few watts to 100 watts. Offset tuning, QSK
Built in SWR and Power meter. Xtal Calibrator.
Excellent condition With manual \$250.00
Call Scott (716) 367-9826

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: John Foote <footej@hn.va.nec.com>
Subject: [1475] Kenwood TS-50 as QRP?
Message-ID: <9506058049.AA804955772@bills.hn.va.nec.com>

Does anyone have experience running the Kenwood as a QRP rig?

How easy is it to adjust the output power to, say, one watt? As it comes from the factory the CW bandwidth is way too high. Does the 500 Hz filter option help?

Are these rigs as bug-free as they seem to be?

Thanks in advance for the input.

Why doesn't Kenwood come out with another run of the TS-130V series, anyway?

72 de KR4GL
John Foote

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: burdick@interval.com (Wayne Burdick)
Subject: [1485] Keyer/Counter testers needed
Message-ID: <199507051800.LAA00931@interval.interval.com>

Hi all,

My keyer and displayless frequency counter (the "WRA-1", for Wilderness Radio Accessory #1) is up and running on the NorCal 40A. Now I now need some volunteers with a variety of QRP rigs to try installing it, in exchange for a FREE, early release of the programmed PIC chip. (Since the chip is re-programmable, you can also send it back later for an upgrade at

any time. I suspect there will be a few upgrades in the near future....)

If you have one of the "top ten" commercial QRP rigs (whatever those are), and you'd like to try installing the keyer/counter module, please let me know. Here are some of the rigs that I'll definitely need a volunteer for:

Small Wonders Labs 40-40
Sierra
Cascade

You'll have to design a small amount of interface circuitry to adapt the WRA-1 to the key line, mute line, AF input, and VFO pick-off point of your rig. I'll incorporate your interface notes into the WRA-1 manual (and give you credit!) when it comes time for Wilderness Radio to start selling the kit.

We'll send you:

(1) programmed PIC chip
(1) 74HCT4020 divider
schematic and operating instructions

You'll have to supply:

two momentary pushbutton switches
a 78L05 or other 5V regulator IC
one 10K pot (linear)
a small number of garden-variety discrete parts.

What I'll need in return is:

a schematic showing how you interfaced the keyer/counter to the rig
a list of VFO offsets you programmed in
comments and suggestions

Note: If you're interfacing the WRA-1 to a multiband rig, you'll need to program in multiple offsets for different band edges. If you haven't seen my earlier postings on how this works, refer to the description below.

Thanks,
Wayne
N6KR

Specifications of the WRA-1 (preliminary)

Keyer

- 5 to 50WPM Iambic keyer w/ various keying modes
- one message buffer with up to 48 characters
- user-settable weight

Counter

This frequency counter does not use a display. Instead, you press a button on the front panel to hear the frequency as three digits in Morse code. For example, if your operating frequency is 7.132MHz, you'll hear "132". The rig is not keyed when reporting the frequency; the WRA-1 generates an audio tone that is fed directly to the A.F. amplifier.

Another feature of the counter is frequency search. If you press and hold the FREQ button for >1 second, you are prompted with an 'F', at which point you can enter a frequency to search for. As you turn the VFO knob, the WRA-1 will alert you when you reach the desired frequency.

The WRA-1 will support multiband rigs, too. You can program in up to four different VFO offsets, then use two pins on the board as band selection inputs. This is useful on rigs that cover both 80 and 40 meters, for example: you'll hear "000" as the band edge on 40 meters, and "500" as the band edge on 80 meters. You use the keyer paddle to program the VFO offsets, as well as for all other communication between you and the WRA-1.

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: mitchell@dtcs70.dtc.Kodak.COM (Brad Mitchell)
Subject: [1476] MFJ QRP (historical)
Message-ID: <9507051324.AA14067@dtcs70.dtc.kodak.com>

I was reading (ok like my wife says looking at the pictures), a 1979 QST, and saw
a MFJ-40T qrp transmitter, and accompanying VFO, MFJ-40V .
DId anybody ever buy one of these, see one etc?
It sound like these might be candidates for the
QRP-L museum, along with the Ten Tec Power mites.
73 Brad WB8YGG

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995

From: Roger.Pease@Eng.Sun.COM (Roger Pease)
Subject: [1492] MW stations on the Pixie2
Message-ID: <9507051940.AA14845@immigrant.Eng.Sun.COM>

Over the weekend of the 4th I put together a Pixie2 in an Altoids box. It fits fine with room to spare for little extra, other band inductors, xtals, etc. It puts out a lot more audio than I expected.

Unfortunately it picks up two MW stations (A "talk radio" station, KGO and an unidentified Hispanic music station.) which blot out the ham band stuff. Are there any simple mods to correct this or have I done something wrong? The TX seems to do the right thing.

I know someone else posted here with a similiar problem, but I did not see any reply.

Thanks,

_Roger

Roger M. "QR" Pease - KE6PPI - pease@Sun.COM

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: DAN_GOODWIN@HP-Andover-om3.om.hp.com
Subject: [1480] Pixie 2 Schematic
Message-ID: <H000103601d4080b@MHS>

Item Subject: Text_1
Hi All,

Is the schematic for Pixie2 available? I downloaded the pcb layout from the QRP-L ftp site but I would like to have the schematic also.

Dan, KD1XN

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: Limbert_Mark/svoa0001@ssb.com
Subject: [1486] Pixie 2 Schematic Location
Message-ID: <H000029a009ab289@MHS>

There is a postscript copy of the Pixie 2 schematic in the same directory as the PCB layout file which is /pub/listserv/qrp-1/rigs.

by FTP:

ftp://ftp.lehigh.edu/pub/qrp-1/rigs

by Listserv:

address = listserv@lehigh.edu

mail body = get qrp-1 "pixie2.txt.Z"

-Mark Limbert mdlimbe@clipper.ssb.com

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: "Norman E. Fink" <norm@uu1238.flowerslabs.com>
Subject: [1483] Pixie2 Schematic
Message-ID: <9507051640.AA11859@flowerslabs.com>

Re: Pixie2 Schematic Request

>Item Subject: Text_1

> Hi All,

>

> Is the schematic for Pixie2 available? I downloaded the pcb layout

> from the QRP-L ftp site but I would like to have the schematic also.

>

> Dan, KD1XN

I am also interested in obtaining a schematic for the Pixie2.

Norm, K2NF

norm@uu1238.flowerslabs.com

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995

From: Glen Leinweber <leinwebe@mcmail.CIS.McMaster.CA>
Subject: [1477] pushing LM386 audio
Message-ID: <1995Jul05.104614-0400@[130.113.234.7]>

Someone suggested pushing the LM386 audio power amplifier up to a 12 volt supply from 9 volts. Be careful.

Those little 8-pin plastic packages just can't dissipate a lot of heat. Its possible to fry the poor little fellow if you crank the audio up too high.

The package, with no extra heat sink, (and @ 25 deg C ambient temp) really sweats at 660 mW power dissipation. With 8 ohm speaker attached, its possible to go over 800 mW. Mind you, the audio would sound very loud and very distorted at that high level. To stay within dissipation limits, you need to keep the audio below 250 mW...enough for many environments (sans automobile).

Heat sinking a plastic package doesn't work very effectively, but it couldn't hurt.

With the 9 volt supply, its very unlikely to fry with 8 ohm load (or higher).

A 16 ohm speaker (or higher) is OK with 12 volt supply.

Here's a general rule of thumb (pun intended):
If you can keep your finger on it for more than 5 seconds, you're below dissipation limits.

Technical info from "AUDIO HANDBOOK"
National Semiconductor 1976

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: N5EM@aol.com
Subject: [1491] QRP (Tiny) Packet
Message-ID: <950705152134_25834941@aol.com>

One of the folks on the list was looking for a small packet TNC, I am sure for their QRP packet station.

Check out the PacComm PicoPacket. 1" x 2.5" x3" (External power .. \$ 129)

Battery Pack model (6vdc slide on battery pack, larger I guess .. \$179)

Hope that helps.

No connections here.

Advertisement is in Communications Quarterly, Spring 1995, pg. 5.

PaComm can be reached:

4413 N. Hesperides St.

Tampa, FL 33614-7618

(813) 874-2908

Email: infocq@paccomm.com

Smallest one I have seen.

72

Ed

From qrp-l@lehigh.edu Wed Jul 5 19:04:16 1995

From: Bob Bruninga <bruninga@greatlakes.nadn.navy.mil>

Subject: [1479] QRP for PACKET

Message-ID: <Pine.SUN.3.91.950705110457.4053A-1000000@greatlakes.nadn.navy.mil>

I have been looking for a cheap QRP transceiver KIT to use for 30m packet. Since there are over 50 of us on a dedicated single HF frequency, it seems such a waste to use a \$1000 HF rig when a \$90 Xtal controlled box with a 50W amplifier would do the same thing. I think there is a tremendous market out there for such a 50W (or even 20W) black box FSK data transceiver dedicated to a single freq. I think such a box could be made available for under \$200.

I would be interested in any comments from anyone that has experience with trying to use a direct conversion receiver on packet. I remember seeing an add for a \$69 QRP XCVR kit that, I think, included a 20W amp? But I cannot seem to find that ad anywhere.

If you reply to me, I am NOT a subscriber to this QRP-L list, so please reply to my full internet address. THANKS! 73, Bob WB4APR....

From qrp-l@lehigh.edu Wed Jul 5 19:04:16 1995

From: owen.nelson@smtp.prostar.com

Subject: [1467] Qrp in SSB

Message-ID: <199507050329.XAA63602@nss1.CC.Lehigh.EDU>

Hi Everybody,

I just got back from an excitng and relaxing weekend of camping and radio. Recently there was a question here about running Qrp SSB. This got me going and I now have a Battery/Solar station set up in my Motorhome.

This 4th of July weekend was the test.

I built and tossed a 20M dipole into the trees and after a few non-responses I got a through the pile-up and made a contact with VK2EPT Lou in Sydney, Australia! WOW! What a thrill and all with just 5 Watts!

He was running 400W but turned it down to 25 with no problem.

My program tells me Sydney is 8035 miles.

I am now hooked and netted into QRP!!!

Great Fun, Great Group,

Owen - KB7UXP

To be "mostly harmless" and "very mattress-like"
is very usefull.....sometimes. owen.nelson@prostar.com

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995

From: "Bob Scott" <bob_scott@cpqm.saic.com>

Subject: [1470] QRP/Low Power CW/SSB rigs

Message-ID: <n1407203106.68178@cpqm.saic.com>

I am looking for a CW/SSB rig to take to Boy Scout summer camp this year. Since I do not want to be running down the hill each day to get my battery recharged, low power seems the way to go. Having not had a lot of experience running off battery I may be overlooking rigs that would function well with their power turned down. I wish it to be multi-band as well. While I know that the Sierra would have been ideal, I would not have received it in time to take to camp. So I am open your suggestions as to a recommended rig. Also, if you can tell me about what to expect to pay for it that would be helpful also. I am not looking for new as I wish to keep my costs down. Thanks in advance.

73, Bob AC4QO Bob_Scott@cpqm.saic.com

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995

From: jcumming@clark.dgim.doc.ca (Jim Cummings)

Subject: [1478] S01M on RTTY?

Message-ID: <9507051512.AA24658@clark.dgim.doc.ca>

Did anyone work S01M, from Western Sahara, yesterday evening on 20 metres?
I tried calling a number of times at 4 watts, but no luck after 45 minutes.
Anyone else have success?

=====
 Jim Cummings
 eMail:jcumming@clark.dgim.doc.ca
 packet:VE3XJ@VE3JF.#EONT.ON.CA.NOAM
 73 and live better digitally
 DON'T GET TOO EXCITED...
 because remember, today is the first
 day of the rest of your life.
=====

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: bobhigh@primenet.com (Bob Hightower)
Subject: [1482] SSB Power on QRP+
Message-ID: <199507051632.JAA05535@mailhost.primenet.com>

Has anyone measured the power out on SSB on the QRP+? I know that I am going to lose some power due to antenna loss, but when I show (on the OHR WM-1) about 7 watts out CW, and, with the same antenna, tuner, etc., only 300 MW max on SSB, there must be something gone awry. Anyone else had similar problems, or any other experience with this?

Thanks and 73 Bob KI7MN bobhigh@primenet.com

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: dcwill@ix.netcom.com (Dave Williamson aa4zx/8)
Subject: [1465] yaesu cw filter
Message-ID: <199507050045.RAA20542@ix3.ix.netcom.com>

Anybody got a Yaesu YF112C CW filter they'd like to part with?

dave / aa4zx/8
dcwill@ix.netcom.com

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: rgobrick@public.compuserc.nf.ca (Robert J. Gobrick)
Subject: [1489] Re: Kenwood TS-50 as QRP?
Message-ID: <199507051913.QAA26965@public.compuserc.nf.ca>

Hi John,

I owned a TS-50 for a while and they are ok radios but not so hot for portable battery use (draws lots of current on receive).

You definitely need the CW filter and a decent SSB filter like the one from International Radio would help, since the cheap ceramic filter they have in there now for SSB stinks.

I wrote an article a year or so ago called "Honey I Shrunk the Rig" about resetting the power level pots in the TS-50 for QRP work. The article was in the QRP Quarterly or if you have a QRZ CD Rom you'll find it in there as a mod to the TS-50.

I'm not sure if the rigs are bug-free - I sold mine before it had a chance to break but I will have to say I was not happy with the IF section with its inexpensive ceramic ssb filter and lots of "blow-by" on strong stations. AGC pumped too much for me.

Otherwise it was the first of the subcompact rigs - now that the new Icom and Alinco are on the way we should see some competition (by the way the Ten Tec Scout is not in this league).

Good luck and have fun 73/72 Bob V01DRB/WA6ERB

PS: TS-130 does not have enough bells and whistles and probably cost more money to make it with all of its analogue components than the digital TS-50- hi.

> Does anyone have experience running the Kenwood as a QRP rig?
>
> How easy is it to adjust the output power to, say, one watt? As it
> comes from the factory the CW bandwidth is way too high. Does the 500
> Hz filter option help?
>
> Are these rigs as bug-free as they seem to be?
>
> Thanks in advance for the input.
>
> Why doesn't Kenwood come out with another run of the TS-130V series,
> anyway?

>
> 72 de KR4GL
> John Foote
>
>
>

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: "rohre" <rohre@arlut.utexas.edu>
Subject: [1499] RE: Lightning
Message-ID: <n1407156515.93398@msmailgw1.arlut.utexas.edu>

I must add my echo to those who were trying to say you are not protected. The best thing is to disconnect antennas and AC power plugs, and ground the antennas. Feed lines outside the building. Get Polyphasers' book on lightning protection. Glass is only good for a thousand volts or so, depending on type. With clear window glass at 5000 volts AC in school, we had corona effects on the edges; lightning would be MUCH more voltage. Keep the AC cords well away from the wall outlets unless you are using them, and away from cable TV, phone lines etc. A friend ham locally just got shocked and had his carpet catch fire from a lightning strike to his house while he was using his computer in a sudden storm moving thru situation. The power supply on the carpet shorted out, and set fire to it. Telephone wires in the walls vaporized, as did some AC wiring. Telephones failed. Some appliances escaped, some TV's did not. An electric oven in a stove failed; a microwave oven still worked. A battery operated radio lost an RF preamp transistor. His central air conditioner was fried. He had some MOV's in some outlets. His tallest vertical ham antenna appears untouched, a couple of TV antenna preamps were cooked. A VHF ham antenna seems to have taken part of the hit, and it was in the "cone of protection" of the taller vertical! Only his house completely lost power, it tripped all his breakers. One neighbor had a brown out, but power poles were not hit as far as they can tell.

All of us likely do too little to prevent needless damage to our homes from our hobby; I certainly have rethought my procedures after this incident. Incidentally, this ham does not have extensive HF antennas or towers as he is a Tech plus.

good luck, and hope you study the risks and take some more elaborate precautions.

72, Stuart K5KVH

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: dcwill@ix.netcom.com (Dave Williamson aa4zx/8)
Subject: [1493] Re: new group order for QRP+?
Message-ID: <199507052041.NAA24948@ix3.ix.netcom.com>

>Dave: I tried Stephen Lee's e-mail address as you listed it and the
>message came back as undeliverable?? slee@u.washington.edu
>Pse send back a correction if you have one. TNX es 72, Geno AL7GQ

That's all I have - and that's the correct address. He may be away from school, and hence the undeliverable address. There was another qrp-1'er who could forward stuff to Stephen, but I've lost the name and address. Anybody?

Thanks ... 1/73rd de aa4zx/8

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: "'AB7HI' Stephen Lee" <slee@u.washington.edu>
Subject: [1494] Re: new group order for QRP+?
Message-ID: <Pine.A32.3.91j.950705135317.56313A-100000@homer11.u.washington.edu>

Could be our system was down for maintenance but, hey,
I'm still here: slee@u.washington.edu
As I say all too often...please resend your last msg :(

Stephen Lee
AB7Hi

snip
> >Dave: I tried Stephen Lee's e-mail address as you listed it and the
> >message came back as undeliverable?? slee@u.washington.edu
> >Pse send back a correction if you have one. TNX es 72, Geno AL7GQ
snip

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: Erik Werner <werner@cadman.cit.buffalo.edu>
Subject: [1466] Re: Pixie 2 motorboating
Message-ID: <199507050251.WAA19251@cadman.cit.buffalo.edu>

Well, I finally gave up and decided to take the pixie to grandpa for analysis. (This is the same man who the nurses caught calibrating his heart machine after multiple bypass surgery). Anyway, after grounding

the circuit in multiple places we (correction, he) found that it's getting feedback from the Q2 section of the circuit. Any suggestions on why and how to overcome this? BTW, I built this one on a perf board and I tried to keep the leads as short as possible.

Erik

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: rgobrick@public.compuserve.com (Robert J. Gobrick)
Subject: [1472] Re: Pixie 2 motorboating
Message-ID: <199507051152.JAA17488@public.compuserve.com>

Erik,

I keep hearing stories (and I have to acknowledge those stories with actual experience) that the LM386 etc audio amps are very "capable" amps and are prone to break into oscillation with any hint of feedback. They have such a high gain and in the Pixie 2 circuit I imagine the gain is set close to infinity (theoretically speaking) that you have to watch every lead coming and going from the unit. I suspect that your problem may be in the grounding of the unit and the ground path to/from power leads and to/from earphone. Since your design is bug style, it probably lacks a nice BIG copper ground plane around the chip so that all grounds to the chip are created equal (post July fourthus word that Nels would probably use...).

So maybe switch from a perf board to a piece of pc board and bug mount everything off of the copper using 10 meg ohm resistors etc. OR, just build up a pc board...

One other hint that I am going to write up soon, and something I learned while building my NN1G SWL 40-40. Dave, NN1G in his new matching cabinet for the SWL rigs completely isolates the pc board from the cabinet by mounting on nylon spacers and he only uses one ground return to the chassis sockets (phones, key, ant, power) and that ground is through the antenna shield wire. Every other connector uses the metal of the chassis and that ground return to work. Dave's early 40-40 boards lacked some grounds in a couple of locations (his newer SWL boards have more grounding points) and the rig had a tendency to "take off" if a ground loop developed by having multiple grounds all around. I can verify this - once I isolated my board and only used one ground return my 40-40 works like a champ - and I mean a champ - it is a fantastic rig. I'll be writing this up real soon now for Dennis and the New England QRP 72 newsletter. By the way I raised the topic of single vs multiple grounds for rig design over a year ago here on the qrp-1 and got some great feedback from the gang here - thanks to you all.

Good luck Bob V01DRB/WA6ERB

>Well, I finally gave up and decided to take the pixie to grandpa for
>analysis. (This is the same man who the nurses caught calibrating his
>heart machine after multiple bypass surgery). Anyway, after grounding
>the circuit in multiple places we (correction, he) found that it's getting
>feedback from the Q2 section of the circuit. Any suggestions on why and
>how to overcome this? BTW, I built this one on a perf board and I tried
>to keep the leads as short as possible.

>
>
>Erik
>
>

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: lujce@hooch.CC.Lehigh.EDU
Subject: [1487] Re: Pixie 2 Schematic Location
Message-ID: <95Jul5.142732edt.14522-3+6@hooch.CC.Lehigh.EDU>

> There is a postscript copy of the Pixie 2 shcematic in the same directory
> as the PCB layout file which is /pub/listserv/qrp-1/rigs.

Mark,

You must have been doing this from memory :-)

> by FTP:
> ftp://ftp.lehigh.edu/pub/qrp-1/rigs

should be:

ftp://ftp.lehigh.edu/pub/listserv/qrp-1/rigs/pixie2.ps

> by Listserv:
> address = listserv@lehigh.edu
>
> mail body = get qrp-1 "pixie2.txt.Z"

should be:

mail body = get qrp-1/rigs pixie2.ps

/jim

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: Limbert_Mark/svoa0001@ssb.com
Subject: [1488] Re: Pixie 2 Schematic Location
Message-ID: <H000029a009accd0@MHS>

> > There is a postscript copy of the Pixie 2 schematic in the same directory
> > as the PCB layout file which is /pub/listserv/qrp-1/rigs.

>

> Mark,

>

> You must have been doing this from memory :-)

>

> > by FTP:

> > ftp://ftp.lehigh.edu/pub/qrp-1/rigs

>

> should be:

>

> ftp://ftp.lehigh.edu/pub/listserv/qrp-1/rigs/pixie2.ps

>

> > by Listserv:

> > address = listserv@lehigh.edu

> >

> > mail body = get qrp-1 "pixie2.txt.Z"

>

> should be:

>

> mail body = get qrp-1/rigs pixie2.ps

>

> /jim

>

Caught with my pants down! Yes, Jim, you are right. I kept getting interrupted by people that don't seem to understand that even though I am in the office it doesn't mean I am going to do some work ;-). I was just trying out my own advice and realized that I had put my foot in my mouth.

Thanks For The Catch,
Mark

PS: Do I get partial credit for having the right approach :-)?

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995

From: Mike.Czuhajewski@hambbs.wb3ffv.ampr.org (Mike Czuhajewski)
Subject: [1468] Re Pixie and LM386
Message-ID: <1995Jul04.234259.5334@wb3ffv.ampr.org>

Scanning a recent QRP-L daily digest, I seem to remember someone saying something along the lines of "go ahead and hit the LM386 with the full 12 volts--it can take it". That may be true in some cases, but you need to do a little homework first. I can't seem to find the proper National data book here at home, so will have to dig out particulars at work later, but the LM386 comes in various flavors--LM386-1, LM386-3, etc, where the dash-number indicates the supply voltage it is rated at. Some LM386's will take 12V, others will not. (If I remember, I'll dig out the info and post it later.) 73 and Queue Our Pea DE WA8MCQ

--

Mike Czuhajewski, user of the UniBoard System @ wb3ffv.ampr.org
E-Mail: Mike.Czuhajewski@hambbs.wb3ffv.ampr.org
The WB3FFV Amateur Radio BBS - Located in Baltimore, Maryland USA
Supporting the Amateur Radio Hobby, and TCP/IP InterNetworking

From qrp-l@lehigh.edu Wed Jul 5 19:04:16 1995
From: mitchell@dtcs70.dtc.Kodak.COM (Brad Mitchell)
Subject: [1481] Re: pushing LM386 audio
Message-ID: <9507051609.AA14129@dtcs70.dtc.kodak.com>

I believe that the LM386-4 is a 12 or 16V version of the LM-386.
That's what Ve7QK used in the Epiphyte design.
They are availalble from DigiKey. 73 Brad WB8YGG

From qrp-l@lehigh.edu Wed Jul 5 19:04:16 1995
From: rgobrick@public.compusult.nf.ca (Robert J. Gobrick)
Subject: [1490] Re: QRP for PACKET
Message-ID: <199507051914.QAA26974@public.compusult.nf.ca>

Bob,

Nice to see a famous digital celebrity check into the qrp-l list - please stop by more often since there are a number of us here thinking along the same lines as you - building a small single band qrp (or mini qro) packet ready transceiver. After many years of development of small qrp cw rigs, the QRP community is beginning to just move into small and buildable ssb rigs. Some examples are the designs and kits from The Northern California QRP Club - Cascade 20/80 meter ssb qrp rig and the Vancouver gang's 20 meter ssb called the Epiphyte (sic). Commercially, MFJ has their 20 meter qrp ssb

- the 9420. So the capability to do an afsk transceiver kit is there.

Anyway, nice to hear from you and thanks for your efforts in advancing the digital modes over the years - I still have one of your mini Bell 202 modem boards that I was going to use for a packet TNC many moons ago when I was running a Xerox 820 PBBS system - boy does that date me - hi. And I will say you have advanced the art quite a bit in the last few years with your software work on the GPS packet positioning applications.

Good luck with your search and it probably isn't too far away from seeing a kit for 30 meter qrp AFSK work. It will probably have a VFO but xtal control should certainly be an option. True FSK would probably be even better since you'll never get to use ssb on 30 meters - unless your a "numbers" station - hi.

73/72 Bob VO1DRB/WA6ERB

PS: I would say that direct conversion designs are now passe with some good proven single conversion designs out there using the NE-602 chips and inexpensive xtal filters. But then again the gang got fairly excited here a while back over the high end DC designs of the R2/T2 that was in QST.

>I have been looking for a cheap QRP transceiver KIT to use for 30m
>packet. Since there are over 50 of us on a dedicated single HF
>frequency, it seems such a waste to use a \$1000 HF rig when a \$90 Xtal
>controlled box with a 50W amplifier would do the same thing. I think
>there is a tremendous market out there for such a 50W (or even 20W)
>black box FSK data transceiver dedicated to a single freq. I think such
>a box could be made available for under \$200.

>

> I would be interested in any comments from anyone that has experience
>with trying to use a direct conversion receiver on packet. I remember
>seeing an add for a \$69 QRP XCVR kit that, I think, included a 20W amp?
>But I cannot seem to find that ad anywhere.

>

>If you reply to me, I am NOT a subscriber to this QRP-L list, so please
>reply to my full internet address. THANKS! 73, Bob WB4APR....

>

>

>

From qrp-l@lehigh.edu Wed Jul 5 19:04:16 1995
From: rgobrick@public.compuserc.com (Robert J. Gobrick)
Subject: [1473] Re: QRP/Low Power CW/SSB rigs

Message-ID: <199507051212.JAA17767@public.compuser.net>

Bob,

You have a tall request there - if you need both cw and SSB then your options will be limited also will you need more than 5 watts at times - ie 50 watts. And finally if it's going to be at the camp then maybe the use of a solar panel may help the battery situation - all this means \$\$.

Also I would suspect a qrp cw rig is not going to be appealing to Scouts who don't know the code and the limitations of qrp.

My suggestion:

Used gear - Ten Tec Argosy (analog or digital display) CW/SSB 5 and 50 watts output run off of a solar battery charger/battery combo.

New - Ten Tec Scout (the name will at least go over well..) 5/50 watts CW/SSB powered as above.

And if you don't care about 50 watts then look into a Index Labs QRP+ CW/SSB 5 watt rig and if you further don't care about SSB then any of the great little one banders out there - MFJ (good bet if you need it quick), NN1G Small Wonders Lab rig, Wilderness Radio Norcal 40, Oak Hills Research Explorer etc etc. Used multiband cw rigs would be the Ten Tec Argonauts and the Heath HW8/9.

Good luck and enjoy the camp - sounds like where I'd like to be now..

73/72 bob V01DRB/WA6ERB

>I am looking for a CW/SSB rig to take to Boy Scout summer camp
>this year. Since I do not want to be running down the hill each day
>to get my battery recharged, low power seems the way to go. Having
>not had a lot of experience running off battery I may be overlooking
>rigs that would function well with their power turned down. I wish
>it to be multi-band as well. While I know that the Sierra would have
>been ideal, I would not have received it in time to take to camp. So I
>am open your suggestions as to a recommended rig. Also, if you can
>tell me about what to expect to pay for it that would be helpful also.
>I am not looking for new as I wish to keep my costs down. Thanks
>in advance.

>

> 73, Bob AC4QO Bob_Scott@cpqm.saic.com

>

>

From qrp-l@lehigh.edu Wed Jul 5 19:04:16 1995
From: dcwill@ix.netcom.com (Dave Williamson aa4zx/8)
Subject: [1469] Re: Re Pixie and LM386
Message-ID: <199507051131.EAA15400@ix3.ix.netcom.com>

>Scanning a recent QRP-L daily digest, I seem to remember someone saying
>something along the lines of "go ahead and hit the LM386 with the full
>12 volts--it can take it". That may be true in some cases, but you
>need to do a little homework first. I can't seem to find the proper
>National data book here at home, so will have to dig out particulars at
>work later, but the LM386 comes in various flavors--LM386-1, LM386-3,
>etc, where the dash-number indicates the supply voltage it is rated at.
> Some LM386's will take 12V, others will not. (If I remember, I'll dig
>out the info and post it later.) 73 and Queue Our Pea DE WA8MCQ
>--
>Mike Czuahajewski, user of the UniBoard System @ wb3ffv.ampr.org
>E-Mail: Mike.Czuahajewski@hambbs.wb3ffv.ampr.org

According the the National Semiconductor databook, _Linear Applications
Specific IC's_, the operating voltages are as follows:

Parameter	Min	Max	Units
Operating Supply V			
LM386N-1, -3, LM386M-1	4	12	V
LM386N-4	5	18	V

The absolute max ratings for supply voltage are

LM386N-1, -3, LM386M-1 : 15V
LM386N-4 : 22V

Application Hints, Gain Control:

Nat Semi sez "To make the LM386 a more versatile amplifier, 2 pins, 1 and 8, are provided for gain control. With pins 1 and 8 open (the 1.35 Kohm internal) resistor sets the gain at 20 (26 dB). If a capacitor is put from pin 1 to 8, bypassing the 1.35 Kohm resistor, the gain will go up to 200 (46 dB). If a resistor is placed in series with the capacitor, the gain can be set to any value from 20 to 200. Gain control can also be done to by capacitively coupling a resistor (or FET) from pin 1 to ground.

Additional external components can be placed in parallel with the internal feedback resistors to tailor the gain and frequency response for individual

applications. For example, we can compensate poor speaker bass response by frequency shaping the feedback path. This is done with a series RC from pin 1 to 5 (paralleling the internal 15 k resistor). For 6 dB effective bass boost: $R \sim 15k$, the lowest value for good stable operation is $R = 10k$ if pin 8 is open. If pins 1 and 8 are bypassed then R as low as 2 k can be used. This restriction is because the amplifier is only compensated for closed-loop gains greater than 9.

Input Biasing:

The schematic (get the book! it's free-dw) shows that both inputs are biased to ground with a 50k resistor. The base current of the input transistors is about 250 nA, so the inputs are at about 12.5 mV when left open. If the dc source resistance driving the LM386 is higher than 250k it will contribute very little additional offset (about 2.5 mV at the input, 50 mV at the output). For dc source resistances between these values we can eliminate excess offset by putting a resistor from the unused input to ground, equal in value to the dc source resistance. Of course all offset problems are eliminated if the input is capacitively coupled. When using the LM386 with higher gains (bypassing the 1.35k resistor between pins 1 and 8) it is necessary to bypass the unused input, preventing degradation of gain and possible instabilities. This is done with a 0.1 uF capacitor or a short to ground depending on the dc source resistance on the driven input."

Y'all can call Nat Semi and get this databook and up to 4 others, free, delivered via UPS, each year! by calling 1-800-272-9959. Definitely worth the call.

I hope this adds something to the -386 discussion.....

1/73rd de aa4zx/8, dave

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: Bob Gobrick V01DRB/WA6ERB <bgobrick@terra.nlnet.nf.ca>
Subject: [1474] Re: Re Pixie and LM386
Message-ID: <Pine.OSF.3.91.950705095551.9506A-100000@terra.nlnet.nf.ca>

Dave,

Thanks for the LM386 info and the note on the handbooks available from NAtional Semiconductor - nothing like increasing the "overall knowledge level" of the qrp-1 participants - hi.

73/72 Bob V01DRB/WA6ERB

Bob Gobrick V01DRB/WA6ERB/VE2DRB Newfoundland, Canada

QRPer Galore - QRP ARCI, GQRP, NORCAL, NEQRP, COQRP, MIQRP, NWQRP

Internet: bgobrick@terra.nlnet.nf.ca
rgobrick@public.compusult.nf.ca

Compuserve: 70466.1405@compuserve.com

From qrp-1@lehigh.edu Wed Jul 5 19:04:16 1995
From: "John D. Spittle" <jds@freenet.vancouver.bc.ca>
Subject: [1484] Re: Re Pixie and LM386
Message-ID: <Pine.3.89.9507051014.A779-01000000@freenet.vancouver.bc.ca>

LM386-1 is good for 6V
LM386-3 is good for 9V
LM386-4 is good for 16V

I've never come across a 386-2

72 Derry VE7QK